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LaPadula, III et al.

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(54) **COMPUTERIZED SYSTEM AND METHOD FOR CALIBRATING SPORTS STATISTICS PROJECTIONS BY PLAYER PERFORMANCE TIERS**

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Related U.S. Application Data

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(51) **Int. Cl.**

G06N 5/02	(2006.01)
A63F 13/828	(2014.01)
G06Q 10/00	(2012.01)

(52) **U.S. Cl.**

CPC ***G06N 5/02*** (2013.01); ***A63F 13/828*** (2014.09); ***G06N 5/022*** (2013.01); ***G06Q 10/00*** (2013.01); *A63F 2300/69* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0258421	A1*	11/2006	Nicholas et al.	463/4
2008/0125228	A1*	5/2008	Ware et al.	463/42
2008/0281444	A1*	11/2008	Krieger et al.	700/91
2012/0329542	A1*	12/2012	Sloan et al.	463/9
2013/0166693	A1*	6/2013	Fernandez et al.	709/219

* cited by examiner

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(57) **ABSTRACT**

The system and method provides team guidance recommendations. The system and method provides player selection guidance by realistically valuing top-tier and lower-tier players. The system and method provides situational-based starting lineup recommendations by creating and using tier-specific, non-normal distributions in a probability distribution-based system for providing fantasy sports player selection guidance. The system and method generates variance and accuracy information from historical data of a particular player projection system, and generates non-normal fantasy point distributions from the same player projection system using the previously generated variance and accuracy information.

18 Claims, 24 Drawing Sheets

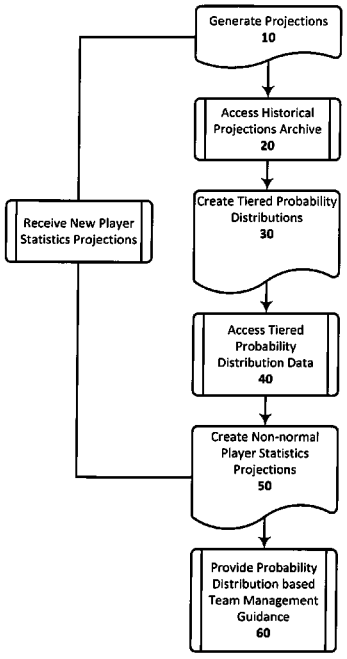
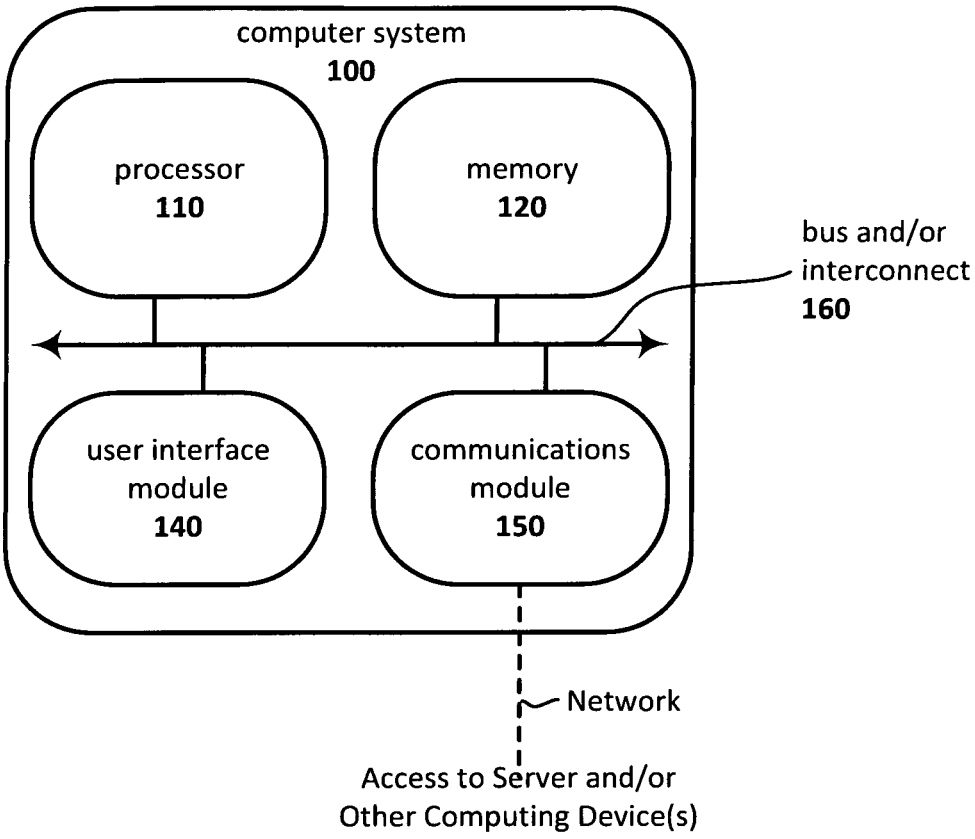


Figure 1A



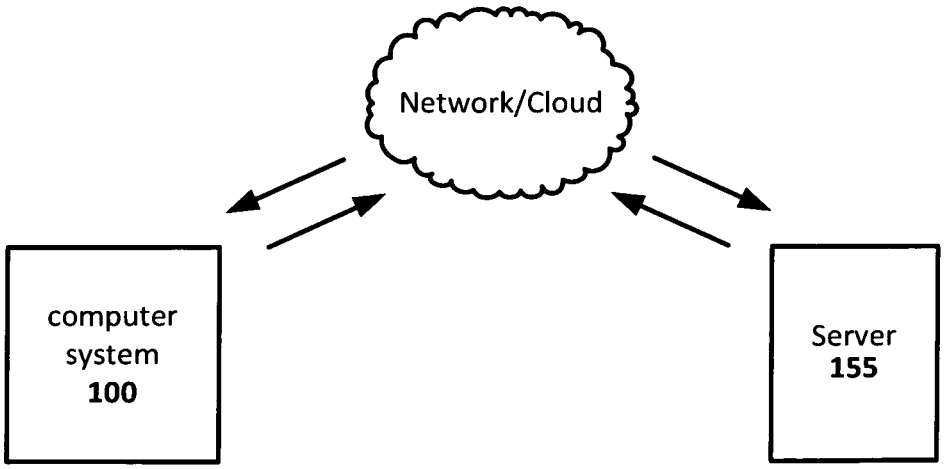
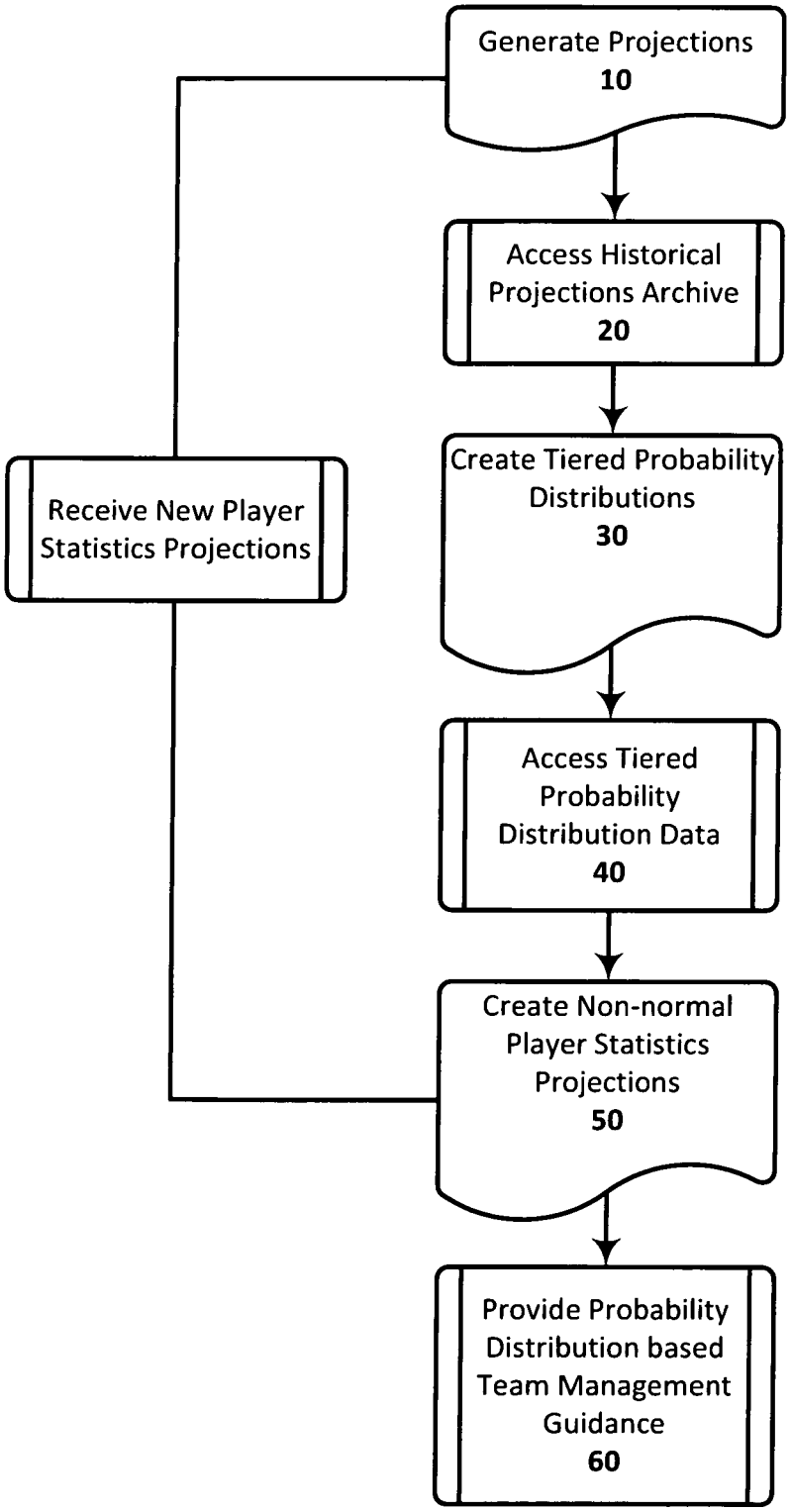


Figure 1B

Figure 2


Generate Projections
10
Access Historical Projections Archive
20
Create Tiered Probability Distributions
30
Access Tiered Probability Distribution Data
40
Create Non-normal Player Statistics Projections
50
Provide Probability Distribution based Team Management Guidance
60
Receive New Player Statistics Projections

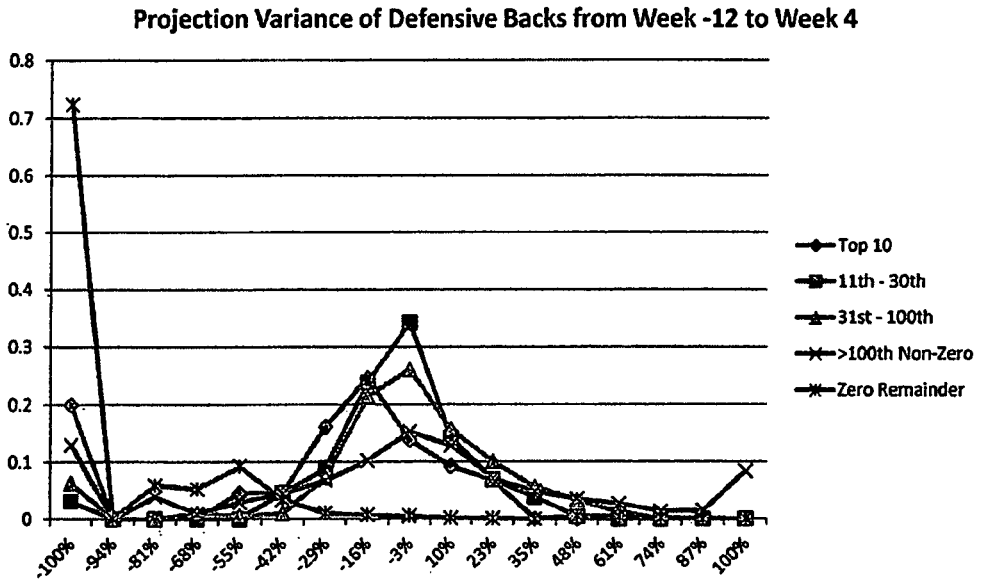

Projection Variance of Defensive Backs from Week -12 to Week 4
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-100%
-94%
-81%
-68%
-55%
-42%
-29%
-16%
-3%
10%
23%
35%
48%
61%
74%
87%
100%
Top 10
11th - 30th
31st - 100th
>100th Non-Zero
Zero Remainder

Figure 3

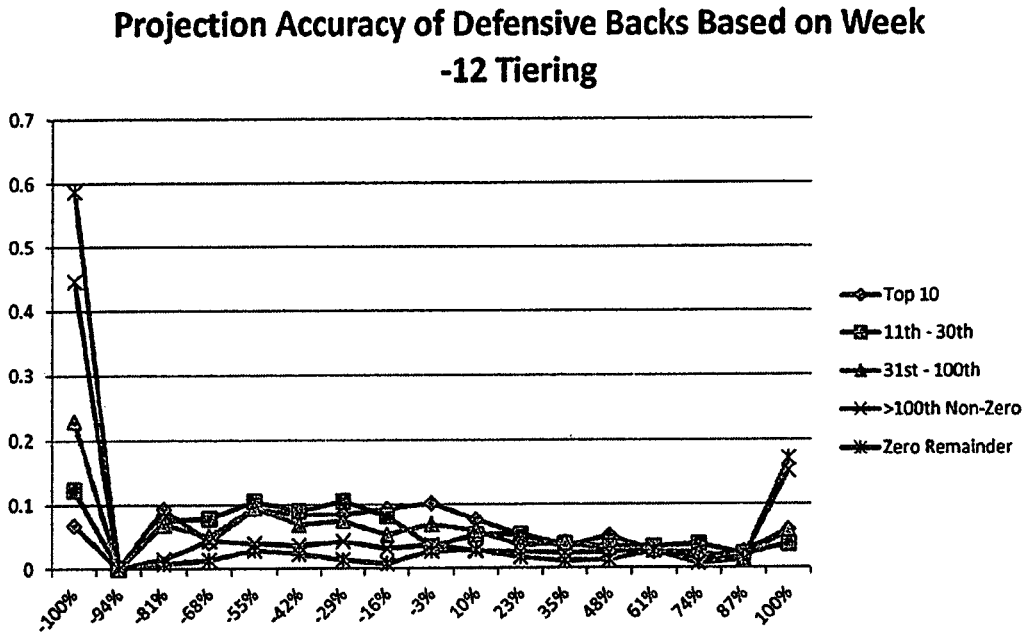

Projection Accuracy of Defensive Backs Based on Week -12 Tiering
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-100%
-94%
-81%
-68%
-55%
-42%
-29%
-16%
-3%
10%
23%
35%
48%
61%
74%
87%
100%
Top 10
11th - 30th
31st - 100th
>100th Non-Zero
Zero Remainder

Figure 4

A	B	C	D	E	F	G	H	I	J	K	L	M
FW -12												
TW 1												
Pos	Tier	TierName	-1	-0.93548	-0.80645	-0.67742	-0.54839	-0.41935	-0.29032	-0.16129	-0.03226	0.096774
DB	1	Top 10	0.10625	0	0	0	0.0125	0.04375	0.04375	0.29375	0.25625	0.1875
DB	2	11th - 30th	0.015625	0	0	0	0.003125	0	0.075	0.25	0.2375	0.253125
DB	3	31st - 100t	0.050893	0	0	0	0	0.001786	0.022321	0.216071	0.255357	0.169643
DB	4	>100th No	0.123964	0	0.00583	0	0.002455	0.007364	0.041731	0.147898	0.224916	0.185026
DB	5	Zero Rem	0.895718	0	0.026243	0.015193	0.037293	0.006906	0.006906	0.000691	0	0
DEF-ST	1	Top 10	0	0	0	0	0	0	0.1	0.2375	0.40625	0.16875
DEF-ST	2	11th - 20th	0	0	0	0	0	0.01875	0.04375	0.2	0.28125	0.29375
DEF-ST	3	21st - 32th	0	0	0	0	0	0.010417	0.057292	0.072917	0.239583	0.208333
DL	1	Top 10	0	0	0	0	0	0	0.01875	0.175	0.29375	0.28125
DL	2	11th - 30th	0.01875	0	0	0	0	0.003125	0.0125	0.275	0.34375	0.2625
DL	3	31st - 100t	0.066964	0	0	0	0	0.005357	0.039286	0.195536	0.216964	0.257143
DL	4	>100th No	0.131549	0	0	0	0	0.002677	0.026386	0.105163	0.256979	0.171319
DL	5	Zero Rem	0.904707	0	0.034443	0.008037	0.049369	0.003444	0	0	0	0
K	1	Top 10	0.0375	0	0	0	0	0	0.03125	0.15	0.64375	0.13125
K	2	11th - 30th	0.184375	0	0	0	0	0	0.009375	0.0625	0.425	0.240625
K	3	31st - 100t	0.2	0	0	0	0	0	0	0	0	0.0125
LB	1	Top 10	0.0125	0	0	0	0	0.0625	0.05	0.40625	0.38125	0.08125
LB	2	11th - 30th	0.00625	0	0	0	0	0.015625	0.084375	0.221875	0.284375	0.2875
LB	3	31st - 100t	0.073214	0	0	0	0	0.0125	0.015179	0.153571	0.216964	0.253571
LB	4	>100th No	0.093617	0	0.004255	0.006383	0.003191	0.006383	0.033511	0.140426	0.229787	0.20266
LB	5	Zero Rem	0.873473	0	0.022688	0.02007	0.006108	0.013089	0.057592	0.006108	0.000873	0
P	1	Top 10	0.1	0	0	0	0	0	0	0.09375	0.475	0.23125
P	2	11th - 30th	0.115625	0	0	0	0	0.046875	0.059375	0.09375	0.334375	0.275
P	3	31st - 100t	0.03125	0	0	0	0	0	0	0	0	0.03125
QB	1	Top 10	0.0125	0	0	0.00625	0	0	0	0.0875	0.68125	0.2125
QB	2	11th - 30th	0.105263	0	0	0	0	0	0.006579	0.184211	0.378289	0.210526
QB	3	31st - 100t	0.213256	0.005764	0.005764	0.002882	0.095101	0	0.008646	0.020173	0.414986	0.014409
RB	1	Top 10	0	0	0	0	0	0.00625	0.03125	0.18125	0.325	0.35625
RB	2	11th - 30th	0	0	0	0	0	0	0.025	0.165625	0.353125	0.31875
RB	3	31st - 100t	0.119643	0	0.03125	0.054464	0.049107	0.03125	0.041964	0.113393	0.171429	0.1125
RB	4	>100th No	0.299669	0	0.011589	0.003311	0.011589	0.014901	0.05298	0.057947	0.155629	0.013245

Figure 5A

N	O	P	Q	R	S	T
0.225806	0.354839	0.483871	0.612903	0.741935	0.870968	1
0.05625	0	0	0	0	0	0
0.09375	0.065625	0.00625	0	0	0	0
0.15625	0.079464	0.027679	0.008929	0.00625	0.002679	0.002679
0.11568	0.060141	0.019945	0.008285	0.006444	0.000614	0.049709
0	0.000691	0.002762	0.005525	0.001381	0.000691	0
0.08125	0.00625	0	0	0	0	0
0.06875	0.075	0.0125	0	0.00625	0	0
0.135417	0.125	0.020833	0.067708	0.026042	0.015625	0.020833
0.19375	0.0375	0	0	0	0	0
0.0625	0.015625	0.00625	0	0	0	0
0.110714	0.075	0.026786	0.002679	0.002679	0	0.000893
0.141491	0.057744	0.017591	0.011472	0.004207	0.002294	0.071128
0	0	0	0	0	0	0
0.00625	0	0	0	0	0	0
0.06875	0.009375	0	0	0	0	0
0	0	0.025	0.0625	0.15	0.25	0.3
0.00625	0	0	0	0	0	0
0.09375	0.003125	0.003125	0	0	0	0
0.185714	0.071429	0.016964	0.000893	0	0	0
0.123936	0.067553	0.030319	0.010106	0.004787	0.001596	0.041489
0	0	0	0	0	0	0
0	0	0	0	0.00625	0	0.09375
0.028125	0	0	0.015625	0.009375	0.00625	0.015625
0.09375	0.25	0.40625	0.15625	0.03125	0	0
0	0	0	0	0	0	0
0.042763	0.036184	0.016447	0.009868	0.009868	0	0
0.020173	0.011527	0.020173	0.014409	0.011527	0.008646	0.132565
0.09375	0.00625	0	0	0	0	0
0.071875	0.021875	0.034375	0.00625	0.003125	0	0
0.063393	0.041964	0.022321	0.016964	0.016071	0.019643	0.094643
0.031457	0.033113	0.038079	0.016556	0.014901	0.004967	0.240066

Figure 5B

A	B	C	D	E	F	G	H	I	J	K	L	M
RB	5	Zero Rem	0.914361	0.01581	0.040843	0.018445	0.00527	0	0	0	0.002635	0
TE	1	Top 10	0	0	0	0	0	0.03125	0.125	0.26875	0.2875	0.25625
TE	2	11th - 30t	0.170347	0	0.041009	0	0.025237	0.050473	0.037855	0.132492	0.277603	0.154574
TE	3	31st - 100	0.292848	0	0.055331	0.024291	0.018893	0.025641	0.031039	0.020243	0.103914	0.068826
TE	5	Zero Rem	1	0	0	0	0	0	0	0	0	0
TMDB	1	Top 10	0	0	0	0	0	0	0.075	0.30625	0.54375	0.075
TMDB	2	11th - 20t	0	0	0	0	0	0	0	0.14375	0.425	0.40625
TMDB	3	21st - 32t	0	0	0	0	0	0	0	0.130208	0.229167	0.421875
TMDL	1	Top 10	0	0	0	0	0	0	0.0375	0.34375	0.33125	0.1875
TMDL	2	11th - 20t	0	0	0	0	0	0	0.0125	0.1125	0.4625	0.2875
TMDL	3	21st - 32t	0	0	0	0	0	0.020833	0.161458	0.203125	0.3125	0.119792
TMK	1	Top 10	0	0	0	0	0	0	0.0125	0.1875	0.6875	0.10625
TMK	2	11th - 20t	0	0	0	0	0	0	0	0.075	0.625	0.26875
TMK	3	21st - 32t	0	0	0	0	0	0	0.005208	0.145833	0.458333	0.286458
TMLB	1	Top 10	0	0	0	0	0	0	0.00625	0.1875	0.575	0.225
TMLB	2	11th - 20t	0	0	0	0	0	0.0125	0.1875	0.025	0.4125	0.275
TMLB	3	21st - 32t	0	0	0	0	0	0	0	0.15625	0.197917	0.255208
TMP	1	Top 10	0	0	0	0.0125	0.05625	0.03125	0	0.09375	0.475	0.23125
TMP	2	11th - 20t	0	0	0	0	0	0.04375	0.3125	0.075	0.38125	0.1875
TMP	3	21st - 32t	0	0	0	0	0	0.03125	0.104167	0.057292	0.255208	0.208333
TMQB	1	Top 10	0	0	0	0	0	0.00625	0.00625	0.0625	0.7125	0.2125
TMQB	2	11th - 20t	0	0	0	0	0	0.00625	0.1375	0.28125	0.39375	0.1625
TMQB	3	21st - 32t	0	0	0	0	0	0	0	0.125	0.442708	0.270833
TMRB	1	Top 10	0	0	0	0	0	0.00625	0.09375	0.2125	0.48125	0.19375
TMRB	2	11th - 20t	0	0	0	0	0	0	0.04375	0.20625	0.29375	0.25625
TMRB	3	21st - 32t	0	0	0	0	0	0.005208	0.020833	0.0625	0.270833	0.255208
TMTE	1	Top 10	0	0	0	0	0.04375	0.09375	0.2125	0.25625	0.19375	0.175
TMTE	2	11th - 20t	0	0	0	0.0875	0.1	0.09375	0.01875	0.1	0.1625	0.28125
TMTE	3	21st - 32t	0	0	0	0.078125	0.005208	0	0.046875	0.088542	0.208333	0.21875
TMWR	1	Top 10	0	0	0	0	0	0	0.05625	0.10625	0.55625	0.28125
TMWR	2	11th - 20t	0	0	0	0	0	0	0	0.1125	0.55625	0.2625
TMWR	3	21st - 32t	0	0	0	0	0	0	0.026042	0.229167	0.307292	0.203125
WR	1	Top 10	0	0	0	0	0	0	0.01875	0.1625	0.35625	0.3875
WR	2	11th - 30t	0	0	0.009464	0.018927	0.009464	0.009464	0	0.069401	0.463722	0.356467

Figure 5C

N	O	P	Q	R	S	T
0	0.001318	0	0	0	0	0.001318
0.03125	0	0	0	0	0	0
0.069401	0.025237	0.009464	0.003155	0.003155	0	0
0.037787	0.032389	0.014845	0.010796	0.010796	0.005398	0.246964
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0.025	0	0	0	0	0	0
0.067708	0.145833	0.005208	0	0	0	0
0.025	0.0625	0.0125	0	0	0	0
0.03125	0.075	0.01875	0	0	0	0
0.041667	0.109375	0.03125	0	0	0	0
0.00625	0	0	0	0	0	0
0.03125	0	0	0	0	0	0
0.083333	0.020833	0	0	0	0	0
0.00625	0	0	0	0	0	0
0.0875	0	0	0	0	0	0
0.25	0.078125	0.03125	0.03125	0	0	0
0	0	0	0	0.00625	0	0.09375
0	0	0	0	0	0	0
0.010417	0.036458	0.098958	0.03125	0.03125	0.041667	0.09375
0	0	0	0	0	0	0
0.01875	0	0	0	0	0	0
0.135417	0.026042	0	0	0	0	0
0.0125	0	0	0	0	0	0
0.16875	0.01875	0.0125	0	0	0	0
0.203125	0.09375	0.057292	0.026042	0	0.005208	0
0.025	0	0	0	0	0	0
0.13125	0.025	0	0	0	0	0
0.072917	0.015625	0.026042	0.020833	0.015625	0.005208	0.197917
0	0	0	0	0	0	0
0.05	0.01875	0	0	0	0	0
0.15625	0.067708	0.010417	0	0	0	0
0.05625	0.0125	0.00625	0	0	0	0
0.063091	0	0	0	0	0	0

Figure 5D

A	B	C	D	E	F	G	H	I	J	K	L	M
WR	3	31st - 100t	0.04409	0	0.031895	0.047842	0.050657	0.049719	0.050657	0.143527	0.210131	0.199812
WR	4	>100th No	0.283509	0	0.044679	0.021121	0.025995	0.021121	0.03818	0.032494	0.086921	0.034119
WR	5	Zero Rem	0.822934	0.096121	0.008432	0.021922	0.016863	0.006745	0	0	0	0
TW 2												
Pos	Tier	TierName	-1	-0.93548	-0.80645	-0.67742	-0.54839	-0.41935	-0.29032	-0.16129	-0.03226	0.096774
DB	1	Top 10	0.2	0	0	0	0.006667	0.046667	0.06	0.346667	0.173333	0.166667
DB	2	11th - 30th	0.013333	0	0	0	0.003333	0.003333	0.106667	0.163333	0.266667	0.28
DB	3	31st - 100t	0.06381	0	0	0.004762	0.009524	0	0.018095	0.139048	0.279048	0.23619
DB	4	>100th No	0.159725	0	0.007215	0.012135	0.014759	0.019351	0.065267	0.128239	0.169892	0.13611
DB	5	Zero Rem	0.807639	0.004167	0.034028	0.033333	0.059722	0.023611	0.021528	0.004861	0	0.000694
DEF-ST	1	Top 10	0	0	0	0	0	0.04	0.073333	0.213333	0.353333	0.16
DEF-ST	2	11th - 20th	0	0	0	0.006667	0.026667	0.04	0.133333	0.22	0.2	0.146667
DEF-ST	3	21st - 32th	0	0	0	0	0	0.016667	0.038889	0.105556	0.172222	0.166667
DL	1	Top 10	0	0	0	0	0	0.006667	0.033333	0.12	0.226667	0.28
DL	2	11th - 30th	0.013333	0	0	0	0.003333	0.04	0.033333	0.163333	0.303333	0.253333
DL	3	31st - 100t	0.080952	0	0.004762	0.001905	0.018095	0.012381	0.052381	0.19619	0.233333	0.167619
DL	4	>100th No	0.176157	0	0	0.001639	0.014748	0.035231	0.04998	0.104056	0.170012	0.099959
DL	5	Zero Rem	0.704019	0	0.084044	0.101096	0.049939	0.034105	0.015834	0.008526	0.002436	0
K	1	Top 10	0.233333	0	0	0	0	0	0.026667	0.166667	0.38	0.193333
K	2	11th - 30th	0.186667	0	0	0	0	0	0.006667	0.063333	0.343333	0.28
K	3	31st - 100t	0.2	0	0	0	0	0	0	0	0	0.013333
LB	1	Top 10	0.013333	0	0	0	0	0	0.073333	0.486667	0.293333	0.12
LB	2	11th - 30th	0.053333	0	0	0	0	0.006667	0.053333	0.206667	0.236667	0.296667
LB	3	31st - 100t	0.082857	0	0.002857	0.009524	0.005714	0.026667	0.048571	0.097143	0.241905	0.220952
LB	4	>100th No	0.133635	0	0.006229	0.007361	0.02265	0.023783	0.083805	0.135334	0.197055	0.103058
LB	5	Zero Rem	0.807116	0.004682	0.01779	0.040262	0.013109	0.035581	0.035581	0.015918	0.015918	0
P	1	Top 10	0.1	0	0	0	0	0	0.026667	0.1	0.4	0.233333
P	2	11th - 30th	0.116667	0	0	0	0.013333	0.066667	0.02	0.096667	0.34	0.146667
P	3	31st - 100t	0.033333	0	0	0	0	0	0	0	0	0.133333
QB	1	Top 10	0.06	0	0	0	0	0	0.053333	0.26	0.326667	0.24
QB	2	11th - 30th	0.104895	0	0.003497	0	0	0	0.006993	0.143357	0.293706	0.164336
QB	3	31st - 100t	0.220544	0.015106	0.030211	0.009063	0.102719	0	0.009063	0.003021	0.329305	0.012085
RB	1	Top 10	0	0	0	0	0	0.006667	0.06	0.213333	0.28	0.286667

Figure 5E

N	O	P	Q	R	S	T
0.101313	0.041276	0.014071	0.007505	0.003752	0.002814	0.000938
0.023558	0.020309	0.021933	0.017059	0.014622	0.010561	0.303818
0	0.003373	0.001686	0.010118	0.005059	0.003373	0.003373
0.225806	0.354839	0.483871	0.612903	0.741935	0.870968	1
0	0	0	0	0	0	0
0.09	0.073333	0	0	0	0	0
0.140952	0.065714	0.024762	0.007619	0.007619	0.001905	0.000952
0.100689	0.049524	0.031814	0.024926	0.008527	0.00656	0.065267
0	0	0	0.004167	0.004861	0.001389	0
0.08	0.033333	0.006667	0.026667	0.006667	0	0.006667
0.06	0.053333	0.02	0.04	0.026667	0.006667	0.02
0.127778	0.072222	0.066667	0.055556	0.05	0.027778	0.1
0.186667	0.106667	0.006667	0.02	0.006667	0.006667	0
0.146667	0.033333	0.01	0	0	0	0
0.098095	0.065714	0.03619	0.014286	0.009524	0.005714	0.002857
0.07456	0.059812	0.050389	0.045063	0.017616	0.010651	0.090127
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0.086667	0.033333	0	0	0	0	0
0	0	0.013333	0.093333	0.24	0.146667	0.293333
0.013333	0	0	0	0	0	0
0.086667	0.04	0.016667	0.003333	0	0	0
0.11619	0.08	0.047619	0.015238	0.004762	0	0
0.078709	0.048698	0.035674	0.035674	0.015289	0.015289	0.057758
0	0	0	0	0	0	0.014045
0.04	0	0	0	0	0	0.1
0.07	0.066667	0.016667	0.02	0.006667	0.003333	0.016667
0.166667	0.4	0.266667	0	0	0	0
0.053333	0.006667	0	0	0	0	0
0.129371	0.062937	0.052448	0.01049	0.013986	0.01049	0.003497
0.006042	0.006042	0.012085	0.003021	0.006042	0.024169	0.21148
0.1	0.026667	0.026667	0	0	0	0

Figure 5F

Position	AveTier3
DB	3.890504
DEF-ST	7.953431
DL	2.618571
K	1.578075
LB	3.835966
P	2.392647
QB	0.431312
RB	3.317899
TE	0.617731
TMDB	43.57353
TMDL	11.41961
TMK	6.508824
TMLB	15.33088
TMP	6.054412
TMQB	9.648039
TMRB	14.43676
TMTE	3.62549
TMWR	15.00049
WR	4.313529

Figure 6

A	B	C	D	E	F	G	H	I	J	K	L	M
Position	Tier	Team	Week	PlayerID	-12	-11	-10	-9	-8	-7	-6	-5
DB	1	MIA	1	232	7.2	7.2	7.2	7.2	7	7	7	7.2
DB	1	MIA	2	232	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3
DB	1	MIA	3	232	7	7	7	7	6.6	6.6	6.6	6.8
DB	1	MIA	4	232	6.8	6.8	6.8	6.8	6.7	6.7	6.7	6.8
DB	1	MIA	5	232	0	0	0	0	0	0	0	0
DB	1	MIA	6	232	7	7	7	7	7.2	7.2	7.2	7
DB	1	MIA	7	232	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.3
DB	1	MIA	8	232	6.9	6.9	6.9	6.9	6.9	6.9	6.9	7
DB	1	MIA	9	232	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8
DB	1	MIA	10	232	7.1	7.1	7.1	7.1	6.8	6.8	6.8	7.2
DB	1	MIA	11	232	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.5
DB	1	MIA	12	232	6.7	6.7	6.7	6.7	6.5	6.5	6.5	6.5
DB	1	MIA	13	232	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.9
DB	1	MIA	14	232	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
DB	1	MIA	15	232	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.9
DB	1	MIA	16	232	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
DB	1	MIA	17	232	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6
DB	1	MIA	18	232	113.8	113.8	113.8	113.8	112.9	112.9	112.9	114.1
DB	1	CHI	1	201	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.5
DB	1	CHI	2	201	7.9	7.9	7.9	7.9	7.5	7.5	7.5	7.7
DB	1	CHI	3	201	7.3	7.3	7.3	7.3	7.2	7.2	7.2	7.4
DB	1	CHI	4	201	7.4	7.4	7.4	7.4	7.1	7.1	7.1	7.1
DB	1	CHI	5	201	7	7	7	7	7.1	7.1	7.1	7
DB	1	CHI	6	201	7.1	7.1	7.1	7.1	6.8	6.8	6.8	6.6
DB	1	CHI	7	201	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8
DB	1	CHI	8	201	0	0	0	0	0	0	0	0
DB	1	CHI	9	201	7	7	7	7	7	7	7	7
DB	1	CHI	10	201	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3
DB	1	CHI	11	201	7	7	7	7	7.3	7.3	7.3	7.2
DB	1	CHI	12	201	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7
DB	1	CHI	13	201	6.9	6.9	6.9	6.9	6.8	6.8	6.8	6.8
DB	1	CHI	14	201	7.3	7.3	7.3	7.3	7	7	7	7
DB	1	CHI	15	201	7.3	7.3	7.3	7.3	7.1	7.1	7.1	7.3
DB	1	CHI	16	201	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2
DB	1	CHI	17	201	6.5	6.5	6.5	6.5	7	7	7	6.5
DB	1	CHI	18	201	113.6	113.6	113.6	113.6	113.2	113.2	113.2	112.4

Figure 7A

N	O	P	Q	R	S	T	U	V	W	X	Y
-4	-3	-2	-1	0	1	2	3	4	5	6	7
6.9	6.9	6.9	6.9	6	6.1						
7.2	7.1	7.1	7.1	6.4	6.4	6					
6.9	6.9	6.9	6.9	6	6.5	5.7	5.1				
6.7	6.8	6.8	6.8	5.9	6.2	6	5.3	5.7			
0	0	0	0	0	0	0	0	0	0		
6.9	7.2	7.2	7.2	6.2	6.6	6.2	5.6	5.8	6.3	7.2	
7.5	7.2	7.2	7.2	6.5	6.7	6	5.4	5.2	5.8	6.4	6.4
7	7	7	7	6.1	6.4	6.2	5.3	5.4	5.9	7.1	7.2
6.7	6.6	6.6	6.6	5.8	6.3	5.9	5.4	5.3	5.8	7	7.1
7	7	7	7	6.1	6.5	6	5.1	5.3	5.7	6.9	7
7.3	7.3	7.3	7.3	6.4	6.8	5.9	5.2	5.2	5.6	6.9	7
6.6	6.8	6.8	6.8	6.1	6.5	6.3	5.5	5.7	5.9	7.4	7.5
7.9	8.1	8.1	8.1	6.9	7	6.4	5.8	5.6	5.9	7.4	7.1
7.7	7.5	7.5	7.5	7	7.2	6.5	5.6	5.6	6.2	7.3	7.2
6.8	6.9	6.9	6.9	6	6.2	5.4	5	5.2	5.6	6.8	6.8
6.6	6.4	6.4	6.4	5.9	6.2	5.8	5.1	5.4	5.8	7.1	7.1
7.6	7.6	7.6	7.6	6.8	6.9	6.3	5.6	5.8	6.2	7.4	7.4
113.3	113.3	113.3	113.3	100.1	104.5	90.6	75	71.2	70.7	84.9	77.8
6.6	6.3	6.3	6.3	5.9	5.5						
7.8	7.7	7.7	7.7	7.6	6.7	6.4					
7.3	7.1	7.1	7.1	6.6	6.5	6.5	6.1				
7.2	7	7	7	7.1	6.5	6.3	6.6	5.6			
7	7.4	7.4	7.4	7.3	6.1	6.3	6.2	6.1	5.9		
6.5	6.5	6.5	6.5	6.1	6	5.9	5.5	5.2	5.2	6.1	
7	6.8	6.8	6.8	6.8	5.8	6.6	6.4	5.9	5.9	6.9	7
0	0	0	0	0	0	0	0	0	0	0	0
6.8	7.2	7.2	7.2	7.3	6.2	6.2	6.6	6.4	6.3	7.2	7.8
7.2	7.2	7.2	7.2	6.4	6.5	6.6	6.6	6.1	6	6.6	6.7
7.2	7.1	7.1	7.1	6.6	6.3	6.7	6.7	6.6	6.4	7.4	7.6
7.2	7.3	7.3	7.3	7.5	6.1	6.2	6.4	5.8	5.9	6.7	7
6.7	7	7	7	6.2	6	6.2	6.4	5.9	5.8	6.7	6.8
7	7	7	7	7.3	5.9	6.1	6.2	5.9	5.9	6.2	6.4
7.5	7.2	7.2	7.2	7.3	6.3	5.7	5.4	5.1	5.2	6.3	6.3
7.2	7.1	7.1	7.1	7.2	6.2	6.1	6.2	6.3	5.9	6.7	7
6.8	6.7	6.7	6.7	6.9	5.9	5.6	5.5	5.3	5.6	6	6.8
113	112.6	112.6	112.6	110.1	98.5	93.4	86.8	76.2	70	72.8	69.4

Figure 7B

Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
8	9	10	11	12	13	14	15	16	17		Last	Final
											6.1	5
											6	4
											5.1	3
											5.7	14
											0	0
											7.2	7
											6.4	11
7.4											7.4	5
7.3	7.1										7.1	5
7.2	7.8	7.5									7.5	2
7.2	7.1	7.2	7.2								7.2	7
7.6	7.3	7.4	7.5	7.4							7.4	4
7.6	7.6	7.4	7.7	7.5	7.5						7.5	3
7.9	7.6	7.5	7.8	7.8	7.6	7.6					7.6	6
7.1	6.9	6.9	7.2	7.1	7.3	7.4	7				7	3
7.4	7.3	7.1	7.6	7.4	7.4	7.2	7.3	7.2			7.2	11
7.7	7.6	7.8	7.9	7.8	7.9	7.8	8	7.5	7.9			
74.4	66.3	58.8	52.9	45	37.7	30	22.3	14.7	7.9			
											5.5	7
											6.4	7
											6.1	4
											5.6	6
											5.9	8
											6.1	10
											7	9
0											0	0
7.6	8.3										8.3	2
6.8	7.1	7									7	21
7.8	8.6	8.4	8.5								8.5	10
7.3	7.9	7.8	8.1	8.2							8.2	3
7.1	7.3	7.2	7.3	7.9	7.8						7.8	8
6.5	7.4	7.1	7.5	7.5	7.7	8					8	9
6.3	6.7	6.6	7.1	7.4	7.5	7.3	7.6				7.6	1
7.1	7.7	7.1	7.6	7.8	8	8	8	7.9			7.9	7
7.1	6.9	6.8	6.9	8	7.5	7.7	8.3	8.1	7.9			
63.6	67.9	58	53	46.8	38.5	31	23.9	16	7.9			

Figure 7C

AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY
zerpProje	RC	zeroResul	-1	-0.93548	-0.80645	-0.67742	-0.54839	-0.41935	-0.29032	-0.16129	-0.03226
0	-0.15278	0	0	0	0	0	0	0	0	1	0
0	-0.11111	0	0	0	0	0	0	0	0	1	0
0	-0.07143	0	0	0	0	0	0	0	0	0	1
0	-0.08824	0	0	0	0	0	0	0	0	0	1
1		1			1		1				
0	-0.05714	0	0	0	0	0	0	0	0	0	1
0	-0.08219	0	0	0	0	0	0	0	0	0	1
0	-0.07246	0	0	0	0	0	0	0	0	0	1
0	-0.0597	0	0	0	0	0	0	0	0	0	1
0	-0.08451	0	0	0	0	0	0	0	0	0	1
0	-0.08108	0	0	0	0	0	0	0	0	0	1
0	-0.02985	0	0	0	0	0	0	0	0	0	1
0	-0.10256	0	0	0	0	0	0	0	0	1	0
0	-0.06494	0	0	0	0	0	0	0	0	0	1
0	-0.07463	0	0	0	0	0	0	0	0	0	1
0	-0.06061	0	0	0	0	0	0	0	0	0	1
0	-0.1039	0	0	0	0	0	0	0	0	1	0
0	-0.15385	0	0	0	0	0	0	0	0	1	0
0	-0.1519	0	0	0	0	0	0	0	0	1	0
0	-0.10959	0	0	0	0	0	0	0	0	1	0
0	-0.12162	0	0	0	0	0	0	0	0	1	0
0	-0.12857	0	0	0	0	0	0	0	0	1	0
0	-0.15493	0	0	0	0	0	0	0	0	1	0
0	-0.13433	0	0	0	0	0	0	0	0	1	0
1		1			1		1				
0	-0.11429	0	0	0	0	0	0	0	0	1	0
0	-0.09722	0	0	0	0	0	0	0	0	1	0
0	-0.1	0	0	0	0	0	0	0	0	1	0
0	-0.17568	0	0	0	0	0	0	0	0	1	0
0	-0.13043	0	0	0	0	0	0	0	0	1	0
0	-0.19178	0	0	0	0	0	0	0	0	1	0
0	-0.13699	0	0	0	0	0	0	0	0	1	0
0	-0.12676	0	0	0	0	0	0	0	0	1	0
0	-0.09231	0	0	0	0	0	0	0	0	0	1

Figure 7D

AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL
0.096774	0.225806	0.354839	0.483871	0.612903	0.741935	0.870968	1		zerpProje	RC	zeroResul	-1
0	0	0	0	0	0	0	0		0	-0.18033	0	0
0	0	0	0	0	0	0	0		0	-0.33333	0	0
0	0	0	0	0	0	0	0		0	-0.41176	0	0
0	0	0	0	0	0	0	0		0	1.45614	0	0
0	0	0	0	0	0	0	0		0	-0.02778	0	0
0	0	0	0	0	0	0	0		0	0.71875	0	0
0	0	0	0	0	0	0	0		0	-0.32432	0	0
0	0	0	0	0	0	0	0		0	-0.29577	0	0
0	0	0	0	0	0	0	0		0	-0.73333	0	0
0	0	0	0	0	0	0	0		0	-0.02778	0	0
0	0	0	0	0	0	0	0		0	-0.45946	0	0
0	0	0	0	0	0	0	0		0	-0.6	0	0
0	0	0	0	0	0	0	0		0	-0.21053	0	0
0	0	0	0	0	0	0	0		0	-0.57143	0	0
0	0	0	0	0	0	0	0		0	0.527778	0	0
0	0	0	0	0	0	0	0		0		0	0
0	0	0	0	0	0	0	0		0	0.272727	0	0
0	0	0	0	0	0	0	0		0	0.09375	0	0
0	0	0	0	0	0	0	0		0	-0.34426	0	0
0	0	0	0	0	0	0	0		0	0.071429	0	0
0	0	0	0	0	0	0	0		0	0.355932	0	0
0	0	0	0	0	0	0	0		0	0.639344	0	0
0	0	0	0	0	0	0	0		0	0.285714	0	0
0	0	0	0	0	0	0	0		0	-0.75904	0	0
0	0	0	0	0	0	0	0		0	2	0	0
0	0	0	0	0	0	0	0		0	0.176471	0	0
0	0	0	0	0	0	0	0		0	-0.63415	0	0
0	0	0	0	0	0	0	0		0	0.025641	0	0
0	0	0	0	0	0	0	0		0	0.125	0	0
0	0	0	0	0	0	0	0		0	-0.86842	0	0
0	0	0	0	0	0	0	0		0	-0.11392	0	0
0	0	0	0	0	0	0	0		0		0	0

Figure 7E

A	B	C	D	E	F	G	H	I	J	K	L	M
Pos	Tier	-1	-0.93548	-0.80645	-0.67742	-0.54839	-0.41935	-0.29032	-0.16129	-0.03226	0.096774	0.225806
DB	1	0.10625	0	0	0	0.0125	0.04375	0.04375	0.29375	0.25625	0.1875	0.05625
DB	2	0.015625	0	0	0	0.003125	0	0.075	0.25	0.2375	0.253125	0.09375
DB	3	0.050893	0	0	0	0	0.001786	0.022321	0.216071	0.255357	0.169643	0.15625
DB	4	0.123964	0	0.00583	0	0.002455	0.007364	0.041731	0.147898	0.224916	0.185026	0.11568
DB	5	0.895718	0	0.026243	0.015193	0.037293	0.006906	0.006906	0.000691	0	0	0
DEF-ST	1	0	0	0	0	0	0	0.1	0.2375	0.40625	0.16875	0.08125
DEF-ST	2	0	0	0	0	0	0.01875	0.04375	0.2	0.28125	0.29375	0.06875
DEF-ST	3	0	0	0	0	0	0.010417	0.057292	0.072917	0.239583	0.208333	0.135417
DL	1	0	0	0	0	0	0	0.01875	0.175	0.29375	0.28125	0.19375
DL	2	0.01875	0	0	0	0	0.003125	0.0125	0.275	0.34375	0.2625	0.0625
DL	3	0.066964	0	0	0	0	0.005357	0.039286	0.195536	0.216964	0.257143	0.110714
DL	4	0.131549	0	0	0	0	0.002677	0.026386	0.105163	0.256979	0.171319	0.141491
DL	5	0.904707	0	0.034443	0.008037	0.049369	0.003444	0	0	0	0	0
K	1	0.0375	0	0	0	0	0	0.03125	0.15	0.64375	0.13125	0.00625
K	2	0.184375	0	0	0	0	0	0.009375	0.0625	0.425	0.240625	0.06875
K	3	0.2	0	0	0	0	0	0	0	0	0.0125	0
LB	1	0.0125	0	0	0	0	0.0625	0.05	0.40625	0.38125	0.08125	0.00625
LB	2	0.00625	0	0	0	0	0.015625	0.084375	0.221875	0.284375	0.2875	0.09375
LB	3	0.073214	0	0	0	0	0.0125	0.015179	0.153571	0.216964	0.253571	0.185714
LB	4	0.093617	0	0.004255	0.006383	0.003191	0.006383	0.033511	0.140426	0.229787	0.20266	0.123936
LB	5	0.873473	0	0.022688	0.02007	0.006108	0.013089	0.057592	0.006108	0.000873	0	0
P	1	0.1	0	0	0	0	0	0	0.09375	0.475	0.23125	0
P	2	0.115625	0	0	0	0	0.046875	0.059375	0.09375	0.334375	0.275	0.028125
P	3	0.03125	0	0	0	0	0	0	0	0	0.03125	0.09375
QB	1	0.0125	0	0	0.00625	0	0	0	0.0875	0.68125	0.2125	0
QB	2	0.105263	0	0	0	0	0	0.006579	0.184211	0.378289	0.210526	0.042763
QB	3	0.213256	0.005764	0.005764	0.002882	0.095101	0	0.008646	0.020173	0.414986	0.014409	0.020173
RB	1	0	0	0	0	0	0.00625	0.03125	0.18125	0.325	0.35625	0.09375
RB	2	0	0	0	0	0	0	0.025	0.165625	0.353125	0.31875	0.071875
RB	3	0.119643	0	0.03125	0.054464	0.049107	0.03125	0.041964	0.113393	0.171429	0.1125	0.063393
RB	4	0.299669	0	0.011589	0.003311	0.011589	0.014901	0.05298	0.057947	0.155629	0.013245	0.031457
RB	5	0.914361	0.01581	0.040843	0.018445	0.00527	0	0	0	0.002635	0	0
TE	1	0	0	0	0	0	0.03125	0.125	0.26875	0.2875	0.25625	0.03125

Figure 8A

N	O	P	Q	R	S	T
0.354839	0.483871	0.612903	0.741935	0.870968	1	
0	0	0	0	0	0	
0.065625	0.00625	0	0	0	0	
0.079464	0.027679	0.008929	0.00625	0.002679	0.002679	
0.060141	0.019945	0.008285	0.006444	0.000614	0.049709	
0.000691	0.002762	0.005525	0.001381	0.000691	0	
0.00625	0	0	0	0	0	
0.075	0.0125	0	0.00625	0	0	
0.125	0.020833	0.067708	0.026042	0.015625	0.020833	
0.0375	0	0	0	0	0	
0.015625	0.00625	0	0	0	0	
0.075	0.026786	0.002679	0.002679	0	0.000893	
0.057744	0.017591	0.011472	0.004207	0.002294	0.071128	
0	0	0	0	0	0	
0	0	0	0	0	0	
0.009375	0	0	0	0	0	
0	0.025	0.0625	0.15	0.25	0.3	
0	0	0	0	0	0	
0.003125	0.003125	0	0	0	0	
0.071429	0.016964	0.000893	0	0	0	
0.067553	0.030319	0.010106	0.004787	0.001596	0.041489	
0	0	0	0	0	0	
0	0	0	0.00625	0	0.09375	
0	0	0.015625	0.009375	0.00625	0.015625	
0.25	0.40625	0.15625	0.03125	0	0	
0	0	0	0	0	0	
0.036184	0.016447	0.009868	0.009868	0	0	
0.011527	0.020173	0.014409	0.011527	0.008646	0.132565	
0.00625	0	0	0	0	0	
0.021875	0.034375	0.00625	0.003125	0	0	
0.041964	0.022321	0.016964	0.016071	0.019643	0.094643	
0.033113	0.038079	0.016556	0.014901	0.004967	0.240066	
0.001318	0	0	0	0	0.001318	
0	0	0	0	0	0	

Figure 8B

A	B	C	D	E	F	G	H	I	J	K	L	M
TE	2	0.170347	0	0.041009	0	0.025237	0.050473	0.037855	0.132492	0.277603	0.154574	0.069401
TE	3	0.292848	0	0.055331	0.024291	0.018893	0.025641	0.031039	0.020243	0.103914	0.068826	0.037787
TE	5	1	0	0	0	0	0	0	0	0	0	0
TMDB	1	0	0	0	0	0	0	0.075	0.30625	0.54375	0.075	0
TMDB	2	0	0	0	0	0	0	0	0.14375	0.425	0.40625	0.025
TMDB	3	0	0	0	0	0	0	0	0.130208	0.229167	0.421875	0.067708
TMDL	1	0	0	0	0	0	0	0.0375	0.34375	0.33125	0.1875	0.025
TMDL	2	0	0	0	0	0	0	0.0125	0.1125	0.4625	0.2875	0.03125
TMDL	3	0	0	0	0	0	0.020833	0.161458	0.203125	0.3125	0.119792	0.041667
TMK	1	0	0	0	0	0	0	0.0125	0.1875	0.6875	0.10625	0.00625
TMK	2	0	0	0	0	0	0	0	0.075	0.625	0.26875	0.03125
TMK	3	0	0	0	0	0	0	0.005208	0.145833	0.458333	0.286458	0.083333
TMLB	1	0	0	0	0	0	0	0.00625	0.1875	0.575	0.225	0.00625
TMLB	2	0	0	0	0	0	0.0125	0.1875	0.025	0.4125	0.275	0.0875
TMLB	3	0	0	0	0	0	0	0	0.15625	0.197917	0.255208	0.25
TMP	1	0	0	0	0.0125	0.05625	0.03125	0	0.09375	0.475	0.23125	0
TMP	2	0	0	0	0	0	0.04375	0.3125	0.075	0.38125	0.1875	0
TMP	3	0	0	0	0	0	0.03125	0.104167	0.057292	0.255208	0.208333	0.010417
TMQB	1	0	0	0	0	0	0.00625	0.00625	0.0625	0.7125	0.2125	0
TMQB	2	0	0	0	0	0	0.00625	0.1375	0.28125	0.39375	0.1625	0.01875
TMQB	3	0	0	0	0	0	0	0	0.125	0.442708	0.270833	0.135417
TMRB	1	0	0	0	0	0	0.00625	0.09375	0.2125	0.48125	0.19375	0.0125
TMRB	2	0	0	0	0	0	0	0.04375	0.20625	0.29375	0.25625	0.16875
TMRB	3	0	0	0	0	0	0.005208	0.020833	0.0625	0.270833	0.255208	0.203125
TMTE	1	0	0	0	0	0.04375	0.09375	0.2125	0.25625	0.19375	0.175	0.025
TMTE	2	0	0	0	0.0875	0.1	0.09375	0.01875	0.1	0.1625	0.28125	0.13125
TMTE	3	0	0	0	0.078125	0.005208	0	0.046875	0.088542	0.208333	0.21875	0.072917
TMWR	1	0	0	0	0	0	0	0.05625	0.10625	0.55625	0.28125	0
TMWR	2	0	0	0	0	0	0	0	0.1125	0.55625	0.2625	0.05
TMWR	3	0	0	0	0	0	0	0.026042	0.229167	0.307292	0.203125	0.15625
WR	1	0	0	0	0	0	0	0.01875	0.1625	0.35625	0.3875	0.05625
WR	2	0	0	0.009464	0.018927	0.009464	0.009464	0	0.069401	0.463722	0.356467	0.063091
WR	3	0.04409	0	0.031895	0.047842	0.050657	0.049719	0.050657	0.143527	0.210131	0.199812	0.101313
WR	4	0.283509	0	0.044679	0.021121	0.025995	0.021121	0.03818	0.032494	0.086921	0.034119	0.023558

Figure 8C

N	O	P	Q	R	S	T
0.025237	0.009464	0.003155	0.003155	0	0	
0.032389	0.014845	0.010796	0.010796	0.005398	0.246964	
0	0	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	
0.145833	0.005208	0	0	0	0	
0.0625	0.0125	0	0	0	0	
0.075	0.01875	0	0	0	0	
0.109375	0.03125	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	
0.020833	0	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	
0.078125	0.03125	0.03125	0	0	0	
0	0	0	0.00625	0	0.09375	
0	0	0	0	0	0	
0.036458	0.098958	0.03125	0.03125	0.041667	0.09375	
0	0	0	0	0	0	
0	0	0	0	0	0	
0.026042	0	0	0	0	0	
0	0	0	0	0	0	
0.01875	0.0125	0	0	0	0	
0.09375	0.057292	0.026042	0	0.005208	0	
0	0	0	0	0	0	
0.025	0	0	0	0	0	
0.015625	0.026042	0.020833	0.015625	0.005208	0.197917	
0	0	0	0	0	0	
0.01875	0	0	0	0	0	
0.067708	0.010417	0	0	0	0	
0.0125	0.00625	0	0	0	0	
0	0	0	0	0	0	
0.041276	0.014071	0.007505	0.003752	0.002814	0.000938	
0.020309	0.021933	0.017059	0.014622	0.010561	0.303818	

Figure 8D

A	B	C	D	E	F	G	H	I	J	K	L	M
WR	5	0.822934	0.096121	0.008432	0.021922	0.016863	0.006745	0	0	0	0	0
ACCURACY												
Pos	Tier	-1	-0.93548	-0.80645	-0.67742	-0.54839	-0.41935	-0.29032	-0.16129	-0.03226	0.096774	0.225806
DB	1	0.067797	0	0.09322	0.042373	0.09322	0.084746	0.084746	0.09322	0.101695	0.076271	0.050847
DB	2	0.123596	0	0.074906	0.078652	0.104869	0.089888	0.104869	0.082397	0.033708	0.052434	0.052434
DB	3	0.230256	0	0.068966	0.050056	0.095662	0.068966	0.074527	0.05228	0.068966	0.058954	0.035595
DB	4	0.446412	0.000466	0.014911	0.043802	0.039143	0.035881	0.042404	0.031221	0.036813	0.027027	0.025629
DB	5	0.587669	0	0.007707	0.013487	0.028902	0.023121	0.013487	0.007707	0.026975	0.028902	0.017341
DEF-ST	1	0.062069	0	0.048276	0.082759	0.144828	0.137931	0.068966	0.096552	0.068966	0.027586	0.041379
DEF-ST	2	0.130137	0	0.047945	0.123288	0.061644	0.116438	0.034247	0.061644	0.068493	0.041096	0.047945
DEF-ST	3	0.061111	0	0.072222	0.122222	0.072222	0.111111	0.077778	0.094444	0.094444	0.027778	0.044444
DL	1	0.144828	0	0.089655	0.082759	0.082759	0.075862	0.075862	0.055172	0.048276	0.055172	0.048276
DL	2	0.276978	0	0.07554	0.064748	0.053957	0.061151	0.05036	0.039568	0.053957	0.043165	0.02518
DL	3	0.308041	0	0.02718	0.09513	0.088335	0.062288	0.06342	0.043035	0.04077	0.039638	0.026048
DL	4	0.530194	0	0.003324	0.017175	0.042659	0.037673	0.045983	0.018837	0.031025	0.018837	0.027147
DL	5	0.495298	0	0.003135	0.018809	0.012539	0.037618	0.025078	0.015674	0.043887	0.003135	0.028213
K	1	0.019231	0	0.057692	0.019231	0.057692	0.105769	0.105769	0.125	0.048077	0.086538	0.115385
K	2	0.019685	0	0.03937	0.07874	0.07874	0.114173	0.090551	0.098425	0.082677	0.062992	0.086614
K	3	0.011111	0	0.033333	0.033333	0.033333	0.055556	0.122222	0.211111	0.1	0.1	0.066667
LB	1	0.133803	0	0.077465	0.098592	0.091549	0.077465	0.070423	0.084507	0.042254	0.042254	0.056338
LB	2	0.094545	0	0.054545	0.08	0.101818	0.069091	0.098182	0.072727	0.058182	0.08	0.069091
LB	3	0.228743	0	0.062275	0.074251	0.064671	0.062275	0.065868	0.062275	0.058683	0.063473	0.033533
LB	4	0.559348	0	0.006982	0.027929	0.024825	0.031032	0.026377	0.021722	0.028704	0.022498	0.019395
LB	5	0.529221	0	0.003247	0.019481	0.019481	0.045455	0.019481	0.025974	0.025974	0.022727	0.022727
P	1	0.976563	0	0.015625	0.007813	0	0	0	0	0	0	0
P	2	0.984615	0	0.003846	0	0.003846	0.003846	0	0	0	0.003846	0
P	3	1	0	0	0	0	0	0	0	0	0	0
QB	1	0.030303	0	0.007576	0.007576	0.045455	0.030303	0.106061	0.113636	0.121212	0.128788	0.136364
QB	2	0.09205	0.004184	0.029289	0.025105	0.029289	0.050209	0.079498	0.096234	0.066946	0.087866	0.087866
QB	3	0.704225	0	0.012072	0.002012	0.008048	0.018109	0.018109	0.014085	0.028169	0.016097	0.016097
RB	1	0.039683	0	0.031746	0.095238	0.047619	0.071429	0.071429	0.071429	0.087302	0.134921	0.047619
RB	2	0.09434	0	0.060377	0.049057	0.09434	0.071698	0.098113	0.064151	0.030189	0.045283	0.067925
RB	3	0.230867	0.005102	0.067602	0.0625	0.054847	0.0625	0.052296	0.053571	0.057398	0.035714	0.030612

Figure 8E

N	O	P	Q	R	S	T
0.003373	0.001686	0.010118	0.005059	0.003373	0.003373	
0.354839	0.483871	0.612903	0.741935	0.870968	1	
0.033898	0.050847	0.025424	0.016949	0.025424	0.059322	118
0.037453	0.033708	0.033708	0.037453	0.022472	0.037453	267
0.040044	0.028921	0.027809	0.023359	0.015573	0.060067	899
0.023765	0.024697	0.028425	0.00932	0.017707	0.152377	2146
0.011561	0.013487	0.026975	0.007707	0.013487	0.171484	519
0.027586	0.034483	0.006897	0.02069	0.02069	0.110345	145
0.013699	0.006849	0.027397	0.013699	0.034247	0.171233	146
0.016667	0.022222	0.016667	0.011111	0.022222	0.133333	180
0.034483	0.048276	0.013793	0.041379	0.013793	0.089655	145
0.039568	0.017986	0.028777	0.021583	0.043165	0.104317	278
0.015855	0.023783	0.020385	0.011325	0.012458	0.12231	883
0.012742	0.025485	0.019391	0.007202	0.018283	0.144044	1805
0	0.040752	0.021944	0.003135	0.025078	0.225705	319
0.057692	0.038462	0.048077	0.028846	0.048077	0.038462	104
0.043307	0.03937	0.043307	0.03937	0.027559	0.055118	254
0.055556	0.022222	0.066667	0.044444	0	0.044444	90
0.091549	0.042254	0.007042	0.028169	0.014085	0.042254	142
0.050909	0.036364	0.029091	0.025455	0.014545	0.065455	275
0.034731	0.037126	0.02994	0.020359	0.023952	0.077844	835
0.015516	0.019395	0.022498	0.006206	0.013964	0.153607	1289
0.016234	0.032468	0.022727	0	0.00974	0.185065	308
0	0	0	0	0	0	128
0	0	0	0	0	0	260
0	0	0	0	0	0	36
0.037879	0.090909	0.037879	0.05303	0.030303	0.022727	132
0.087866	0.058577	0.037657	0.041841	0.029289	0.096234	239
0.016097	0.008048	0.016097	0.018109	0.014085	0.090543	497
0.079365	0.055556	0.039683	0.015873	0.031746	0.079365	126
0.033962	0.041509	0.033962	0.045283	0.022642	0.14717	265
0.02551	0.022959	0.026786	0.029337	0.017857	0.164541	784

Figure 8F

A	B	C	D	E	F	G	H	I	J	K	L	M
RB	4	0.567282	0.005277	0.031662	0.039578	0.023747	0.036939	0.021108	0.023747	0.01847	0.015831	0.023747
RB	5	0.472727	0.012121	0.018182	0.036364	0.048485	0.024242	0.042424	0.012121	0.018182	0.012121	0.012121
TE	1	0.057554	0	0.057554	0.086331	0.100719	0.086331	0.079137	0.107914	0.05036	0.035971	0.043165
TE	2	0.175214	0	0.08547	0.08547	0.059829	0.051282	0.051282	0.047009	0.047009	0.017094	0.047009
TE	3	0.490942	0	0.01087	0.019928	0.043478	0.032609	0.036232	0.03442	0.023551	0.019928	0.018116
TE	5	0.714286	0	0.035714	0.071429	0.035714	0.035714	0	0	0	0.035714	0
TMDB	1	0	0	0	0.02	0.033333	0.166667	0.213333	0.2	0.14	0.093333	0.053333
TMDB	2	0	0	0	0.02	0.04	0.186667	0.153333	0.193333	0.153333	0.113333	0.033333
TMDB	3	0	0	0	0.022222	0.066667	0.088889	0.15	0.205556	0.166667	0.105556	0.077778
TMDL	1	0	0	0.013423	0.053691	0.107383	0.154362	0.167785	0.134228	0.120805	0.053691	0.087248
TMDL	2	0	0	0.020134	0.09396	0.087248	0.107383	0.114094	0.147651	0.120805	0.073826	0.04698
TMDL	3	0.005714	0	0.028571	0.062857	0.114286	0.097143	0.102857	0.137143	0.102857	0.097143	0.068571
TMK	1	0.006849	0	0.047945	0.020548	0.061644	0.082192	0.123288	0.164384	0.09589	0.09589	0.09589
TMK	2	0.033557	0	0.040268	0.04698	0.067114	0.09396	0.080537	0.127517	0.087248	0.073826	0.107383
TMK	3	0.011173	0	0.03352	0.089385	0.067039	0.111732	0.100559	0.089385	0.067039	0.067039	0.078212
TMLB	1	0	0	0.006667	0.033333	0.086667	0.14	0.186667	0.146667	0.133333	0.126667	0.04
TMLB	2	0	0	0.026667	0.06	0.066667	0.14	0.166667	0.153333	0.12	0.113333	0.033333
TMLB	3	0	0	0	0.022222	0.127778	0.155556	0.144444	0.138889	0.083333	0.116667	0.1
TMP	1	0.979866	0	0.013423	0.006711	0	0	0	0	0	0	0
TMP	2	0.986577	0	0.006711	0	0	0.006711	0	0	0	0	0
TMP	3	0.988889	0	0	0	0.005556	0	0	0	0	0.005556	0
TMQB	1	0.013423	0	0.013423	0.020134	0.040268	0.040268	0.120805	0.100671	0.14094	0.14094	0.087248
TMQB	2	0.04	0	0.033333	0.02	0.04	0.08	0.06	0.093333	0.1	0.113333	0.066667
TMQB	3	0.011111	0	0.033333	0.027778	0.022222	0.05	0.083333	0.088889	0.072222	0.077778	0.116667
TMRB	1	0	0	0.006667	0.02	0.093333	0.086667	0.073333	0.113333	0.14	0.133333	0.086667
TMRB	2	0	0.006667	0	0.026667	0.066667	0.126667	0.153333	0.066667	0.086667	0.073333	0.106667
TMRB	3	0	0	0.016667	0.027778	0.083333	0.116667	0.083333	0.1	0.111111	0.111111	0.061111
TMTE	1	0.006944	0	0.027778	0.055556	0.138889	0.055556	0.069444	0.090278	0.076389	0.048611	0.055556
TMTE	2	0.053333	0.006667	0.06	0.06	0.12	0.073333	0.08	0.046667	0.066667	0.053333	0.06
TMTE	3	0.08427	0	0.101124	0.095506	0.089888	0.044944	0.078652	0.050562	0.05618	0.033708	0.044944
TMWR	1	0.006667	0	0	0.013333	0.046667	0.086667	0.106667	0.1	0.086667	0.113333	0.106667
TMWR	2	0	0	0.020134	0.067114	0.04698	0.053691	0.100671	0.09396	0.120805	0.120805	0.09396
TMWR	3	0.005556	0	0.005556	0.033333	0.022222	0.038889	0.083333	0.122222	0.105556	0.105556	0.072222
WR	1	0.074627	0	0.074627	0.074627	0.067164	0.059701	0.097015	0.037313	0.052239	0.097015	0.08209

Figure 8G

N	O	P	Q	R	S	T
0.005277	0.007916	0.007916	0.007916	0.010554	0.153034	379
0.024242	0.036364	0.018182	0.018182	0.006061	0.187879	165
0.035971	0.021583	0.043165	0.043165	0.028777	0.122302	139
0.047009	0.021368	0.012821	0.025641	0.017094	0.209402	234
0.021739	0.01087	0.009058	0.016304	0.01087	0.201087	552
0	0	0.035714	0.035714	0	0	28
0.026667	0.02	0.013333	0.013333	0	0.006667	150
0.033333	0.026667	0.02	0.013333	0	0.013333	150
0.033333	0.005556	0.022222	0.022222	0.016667	0.016667	180
0.033557	0.026846	0	0.033557	0.013423	0	149
0.060403	0.020134	0.040268	0.013423	0.013423	0.040268	149
0.057143	0.017143	0.045714	0.005714	0.022857	0.034286	175
0.061644	0.027397	0.027397	0.020548	0.027397	0.041096	146
0.060403	0.020134	0.033557	0.053691	0.026846	0.04698	149
0.027933	0.061453	0.072626	0.039106	0.022346	0.061453	179
0.033333	0.04	0.006667	0.013333	0.006667	0	150
0.026667	0.026667	0.04	0.013333	0.006667	0.006667	150
0.05	0.033333	0.005556	0.005556	0	0.016667	180
0	0	0	0	0	0	149
0	0	0	0	0	0	149
0	0	0	0	0	0	180
0.053691	0.073826	0.053691	0.040268	0.033557	0.026846	149
0.106667	0.073333	0.04	0.04	0.02	0.073333	150
0.072222	0.027778	0.088889	0.038889	0.05	0.138889	180
0.073333	0.033333	0.026667	0.033333	0.033333	0.046667	150
0.113333	0.073333	0.026667	0.046667	0.006667	0.02	150
0.055556	0.05	0.038889	0.044444	0.016667	0.083333	180
0.076389	0.069444	0.055556	0.041667	0.020833	0.111111	144
0.033333	0.033333	0.026667	0.04	0.026667	0.16	150
0.039326	0.016854	0.02809	0.011236	0.016854	0.207865	178
0.126667	0.073333	0.033333	0.033333	0.026667	0.04	150
0.053691	0.053691	0.073826	0.013423	0.04698	0.040268	149
0.1	0.044444	0.033333	0.061111	0.027778	0.138889	180
0.059701	0.052239	0.029851	0.014925	0.022388	0.104478	134

Figure 8H

COMPUTERIZED SYSTEM AND METHOD FOR CALIBRATING SPORTS STATISTICS PROJECTIONS BY PLAYER PERFORMANCE TIERS

RELATED APPLICATIONS

This application claims priority to U.S. Provisional Application No. 61/687,100, filed Apr. 18, 2012 the contents of which is hereby incorporated by reference herein.

FIELD OF THE INVENTION

The present invention relates to calibrating sports statistics projections by player performance tiers and more particularly to a computerized system and method for using historical player projection data to build non-normal probability distributions for various tiers of player performance.

BACKGROUND OF THE INVENTION

Sports statistics projections are a forecast of how players in a particular sports league will perform as measured by a commonly accepted set of performance statistics for that particular sport, such as the number of passing touchdowns for a quarterback in the NFL. Such projections are used by many companies to provide team management guidance tools for assisting with player selection decisions such as drafting players at the beginning of the fantasy sports season.

The majority of currently available tools for sports statistics projections simply use projected values to compare players and analyze their value when providing guidance to the fantasy sports end-user. Probability distributions are used to model the relationship between projections and the actual results, thus providing more accurate player selection guidance. See, for example, Applicant's own work, U.S. patent application Ser. No. 13/520,254, which is incorporated by reference in its entirety. The probability distributions used in current player selection guidance software use normal distribution models to create probability distributions from player statistics projections.

It is recognized that previous models assume all players have equal upside and downside relative to their projected performance regardless of whether they are projected to be a top-tier player or a lower-tier player. In reality, players that are projected to perform at the very top of their respective sports league (top-tier players) generally have a smaller probability of significantly improving compared with the probability of having a degraded performance over the course of a sports season.

Probability distribution-based player selection guidance systems that use a normal distribution model tend to overvalue top-tier players and undervalue lower-tier players and are only able to provide starting lineup guidance based on mean projected values. The system and method of the present invention for creating and using tier-specific, non-normal distributions provides player selection guidance that realistically values top-tier and lower-tier players and provides situational based starting lineup recommendations.

SUMMARY OF THE INVENTION

The system and method of the present invention provides team guidance recommendations. More particularly, the system and method of the present invention provides player selection guidance by realistically valuing top-tier and lower-tier players. In one embodiment, the system and method of the preset invention provides situational-based starting lineup recommendations by creating and using tier-specific, non-normal distributions in a probability distribution-based system for providing fantasy sports player selection guidance. The system and method generates variance and accuracy information from historical data of a particular player projection system, and generates non-normal fantasy point distributions from the same player projection system using the previously generated variance and accuracy information.

It has been recognized that there is a need for a computerized system and method for using historical player projection data to build non-normal probability distributions for various tiers of player performance to represent projection variance and projection accuracy, which can later be used to modify future projections to facilitate realistic upside and downside calibration for each player performance tier.

One aspect of the present invention is a computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance, comprising: providing an archive of player fantasy point projections, wherein the archive comprises fantasy point projection data; calculating tiered probability distributions of projection variances using the fantasy point projection data; calculating tiered probability distributions of projection accuracy using the fantasy point projection data; and creating non-normal fantasy point probability distributions from future player statistics projections thereby providing users with fantasy sport team management guidance.

One embodiment of the computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein the archive comprises AccuScore NFL player fantasy point projections.

One embodiment of the computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance further comprises providing new player statistics projections.

One embodiment of the computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein calculating tiered probability distributions of the projection accuracy is based on the tiers from week −12.

One embodiment of the computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein calculating tiered probability distributions of the projection variance uses the average of Tier 3 players to approximate the variance for Tier 5 players.

One embodiment of the computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein the fantasy sport team management guidance comprises starting lineup recommendations.

Another aspect of the present invention is a computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance, comprising: providing an archive of player fantasy point projections, wherein the archive comprises fantasy point projection data; calculating tiered probability distributions of projection variances using the fantasy point projection data; calculating tiered probability distributions of projection accuracy using the fantasy point projection data; and creating non-normal fantasy point probability distributions

from future player statistics projections thereby providing users with fantasy sport team management guidance.

One embodiment of the computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein the archive comprises AccuScore NFL player fantasy point projections.

One embodiment of the computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance further comprises providing new player statistics projections.

One embodiment of the computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein calculating tiered probability distributions of the projection accuracy is based on the tiers from week −12.

One embodiment of the computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein calculating tiered probability distributions of the projection variance uses the average of Tier 3 players to approximate the variance for Tier 5 players.

One embodiment of the computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein the fantasy sport team management guidance comprises starting lineup recommendations.

Another aspect of the present invention is a non-transitory computer program product comprising program instructions encoded on one or more computer readable mediums that when executed by one or more processors causes a process for using historical player projections to build non-normal probability distributions to be carried out, the process comprising: providing an archive of player fantasy point projections, wherein the archive comprises fantasy point projection data; calculating tiered probability distributions of projection variances using the fantasy point projection data; calculating tiered probability distributions of projection accuracy using the fantasy point projection data; and creating non-normal fantasy point probability distributions from future player statistics projections thereby providing users with fantasy sport team management guidance.

One embodiment of the non-transitory computer program product for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein the archive comprises AccuScore NFL player fantasy point projections.

One embodiment of the non-transitory computer program product for using historical player projection data to build non-normal probability distributions for various tiers of player performance further comprises providing new player statistics projections.

One embodiment of the non-transitory computer program product for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein calculating tiered probability distributions of the projection accuracy is based on the tiers from week −12.

One embodiment of the non-transitory computer program product for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein calculating tiered probability distributions of the projection variance uses the average of Tier 3 players to approximate the variance for Tier 5 players.

One embodiment of the non-transitory computer program product for using historical player projection data to build non-normal probability distributions for various tiers of player performance is wherein the fantasy sport team management guidance comprises starting lineup recommendations.

Two compact disks are submitted with this application. Original compact disks were submitted upon filing of the initial priority application. The two compact disks contain no new matter. The compact disks are submitted in duplicate and are incorporated by reference in their entirety. The titles of the two compact disks are COPY 1 Apr. 9, 2013 and COPY 2 Apr. 9, 2013, respectively. The two compact disks are identical and contain two files, namely, Table 1.csv and Table2.csv. Table 1.csv was created on Apr. 16, 2012 and contains 3,501,138 bytes. Table2.csv was created on Apr. 16, 2012 and contains 7,518,501 bytes. Table 1.csv is referred to in the remainder of the application as "Attachment 1," and Table2.csv is referred to as "Attachment 2" throughout the remainder of the application.

These aspects of the invention are not meant to be exclusive and other features, aspects, and advantages of the present invention will be readily apparent to those of ordinary skill in the art when read in conjunction with the following description, appended claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features, and advantages of the invention will be apparent from the following description of particular embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

FIG. **1**A is a block diagram schematically illustrating selected components of a computer system that can be used for generating and using tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention.

FIG. **1**B is a block diagram of a network computing system that can be used for generating and using tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention.

FIG. **2** is a flow diagram illustrating the process for generating and using tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention.

FIG. **3** is a graphical representation of tiered, non-normal probability distributions showing how defensive back fantasy point projections varied from 12 weeks before the NFL season to week 4 into the NFL season, in accordance with one embodiment of the present invention.

FIG. **4** is a graphical representation of tiered, non-normal probability distributions showing how accurately the final fantasy point projections for the defensive backs matched the actual fantasy point scores, where player tiers are based on projections from 12 weeks before the NFL season, in accordance with one embodiment of the present invention.

Attachment 1 (refer to attached CD-ROM) is a Microsoft Excel Worksheet that demonstrates an embodiment of the present invention for tiered projection variance and accuracy distributions for all player positions from all weeks to all weeks based on analysis of 2011 AccuScore data.

Attachment 2 (refer to attached CD-ROM) is a Microsoft Excel Worksheet that demonstrates an embodiment of the present invention for generating the non-normal variance and accuracy distributions shown in FIG. **2** and FIG. **3**.

FIGS. **5**A-**5**F are snapshots from Attachment 1 that demonstrate generating and using tiered, non-normal player fan-

tasy point projection distributions, in accordance with one embodiment of the present invention.

FIG. **6** is a snapshot from Attachment 2 wherein each position is listed with the corresponding values for the average Tier 3 player for that position, in accordance with one embodiment of the present invention.

FIGS. **7**A-**7**E are snapshots from Attachment 2 that demonstrate generating and using tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention.

FIGS. **8**A-**8**H are snapshots from Attachment 2 that demonstrate generating the non-normal variance and accuracy distributions, in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Various aspects of the illustrative embodiments will be described using terms commonly employed by those skilled in the art to convey the substance of their work to others skilled in the art. However, it will be apparent to those skilled in the art that the present invention may be practiced with only some of the described aspects. For purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the illustrative embodiments. However, it will be apparent to one skilled in the art that the present invention may be practiced without the specific details. In other instances, well-known features are omitted or simplified in order not to obscure the illustrative embodiments.

Various operations will be described as multiple discrete operations, in turn, in a manner that is most helpful in understanding the present invention. However, the order of description should not be construed as to imply that these operations are necessarily order dependent. In particular, these operations do not need to be performed in the order of presentation.

System Architecture

FIG. **1**A schematically illustrates selected components of a computer system **100** that can be used to generate and use tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention. The computer system **100** may comprise, for example, one or more devices selected from a desktop or laptop computer, a workstation, a tablet, a smartphone, a set-top box or any other such computing device. A combination of different devices may be used in certain embodiments. The computer system **100** of this example embodiment includes, among other things, a processor **110**, a memory **120**, a user interface module **140** and a communications module **150**. As can be further seen, a bus and/or interconnect **160** is also provided to allow for intra-device/module communications. Other componentry and functionality not reflected in the schematic block diagram of FIG. **1**A will be apparent in light of this disclosure, and it will be appreciated that the claimed invention is not intended to be limited to any particular hardware configuration.

The processor **110** can be any suitable processor, and may include one or more coprocessors or controllers to assist in control of the computer system **100**. The processor **110** may further include on-board cache to reduce the need for accessing external memory, for example, when executing a given application or carrying out a given process. The memory **120** can be implemented using any suitable type(s) and size(s) of digital storage, such as one or more of a disk drive, a universal serial bus (USB) drive, flash memory and/or random access memory, or any other suitable non-volatile and/or volatile memory technologies. The memory **120** can be used, for example, for processor **110** workspace and/or executable file storage as well as for storing content and user files.

In other embodiments, the computer system **100** may be implemented in a client-server arrangement such as the example embodiment shown in FIG. **1**B wherein the client computing system **100** uses an applet (for example, a JavaScript applet that is executable within a browser application of the computing system **100**) or other downloadable module that can be provisioned in real-time in response to a request from the client computing system **100** for access to a given server **155** having resources that are of interest to the user of the client computing system **100** (for example, a cloud-based repository of data and/or other content to be manipulated by the user). The server **155**, if applicable, can be implemented as a web-based application server or with any other suitable server technology, and may be local to the network or remotely coupled to the network by one or more other networks and/or communication channels.

The communications module **150** can be any suitable network chip or chip set which allows for wired and/or wireless connection to a network so that the computer system **100** can communicate with other local and/or remote computing systems and/or servers, such as shown in FIG. **1**B. The network may be a local area network (for example, a home-based or office network) or a wide area network (for example, the Internet) or a combination of such networks, whether private or public or both. In some cases, access to computing resources on a given network or so-called cloud-based service may require credentials such as usernames and passwords, or any other suitable security mechanisms. Other embodiments of computer system **100** may not be coupled to any network and may just operate as a stand-alone computing system, if so desired.

The user interface module **140** is configured to provide information to, and to receive information and commands from, a user of the computer system **100**; it can be implemented with or otherwise used in conjunction with a variety of suitable input/output devices such as a display, a touchscreen, a speaker, a keyboard, a stylus, a touchpad, a mouse and/or a microphone. The user interface module **140** may be installed local to the computer system **100**, as shown in the example embodiment of FIG. **1**A. Alternatively, the computer system **100** may be implemented in a client-server arrangement such as the example embodiments shown in FIG. **1**B wherein at least some portions of the user interface module **140** may be provided to client computing system **100** using an applet (for example, a JavaScript applet that is executable within a browser application of the computing system **100**) or other downloadable module that can be provisioned in real-time in response to a request from the client computing system **100** for access to a given server **155** having resources that are of interest to the user of the client computing system **100** (for example, a cloud-based repository of data and/or other content to be edited by the user). As previously explained, the server **155** may be local to the network or remotely coupled to the network by one or more other networks and/or communication channels. In any such stand-alone or networked computing scenarios, the user interface module **140** may be implemented with any suitable technologies that allow a user to interact with the computing system, so that functionality of computing resources can be used as desired by that user.

The various embodiments disclosed herein can be implemented in various forms of hardware, software, firmware and/or special purpose processors. For example, in one embodiment a non-transient computer readable medium has instructions encoded thereon that, when executed by one or more processors can generate and use tiered, non-normal

player fantasy point projection distributions, in accordance with one embodiment of the present invention. Such a computer readable medium can be provided in the form of a computer software application or computer program product that is tangibly embodied on one or more memory devices, and that can be executed by a computer having any suitable architecture. In certain embodiments the computer program product is specifically designed for the manipulation of projection distributions, although in other embodiments the functionalities disclosed herein can be incorporated into other software applications. The computer program product may include a number of different modules, sub-modules or other components of distinct functionality that can provide information to, or receive information from, other components. These modules can be used, for example, to communicate with input and output devices such as pointing devices, display screens and/or other user interface devices.

Methodology

The system and method of the present invention provides improved modeling of player projections using non-normal distributions, specifically comprising representations of upsides and downsides compared with projected performance for various tiers of players. The system and method of the present invention enables a probability distribution-based team management guidance system to generate more accurate recommendations for all player selection decisions, such as draft picks or starting lineup selections compared with a similar system that uses normal distributions.

Applicants' previous work focused on building an optimum system for providing team management focused on finding a way to make all decisions based on the probability of winning. The operative assumption was that the projections from the projection provider reasonably accounted for all factors that influence player performance equally for all players. It is now recognized, due in part to performance of Applicants' prior system for fantasy team management guidance that player projections do not account evenly for all factors, and in fact, the prior projection methods introduce biases that influence the mean and the accuracy for different player performance tiers. Prior to gaining experience by using the previous system, there would be no way to foresee the biases of the projection provider's method, much less compensate for them.

Applicants' previous work made many advances in the state of the art of a system and method for team management guidance. The use of probability distributions to calculate the probability to win from the first draft pick in the season through analyzing trades was a huge undertaking. It is now appreciated that the performance of the system and method of the present invention depends on the source of the initial fantasy point projections. As is now appreciated, the fantasy point projections are not equally balanced projections. Therefore, the use of a normal distribution does not fully describe the system. Each projection provider (i.e. of the historical data) introduces different biases and these biases in projections need to be removed in order to create an accurate team management tool. It is also appreciated that randomness in the system isn't true randomness. For example, a quarterback can't throw 1.3 touchdowns in a game. Instead, as in this example, there are finite possibilities (e.g. the quarterback could throw one or two touchdowns, but not 1.3).

It is now recognized that there are second order effects that must be accommodated and compensated for in order to optimize the performance of the method and system of the present invention. It is appreciated that injury plays a major role in player performance and has to be accounted for beyond the basic normal distribution. Additionally, there are many other factors that create biases in sports projections that cause player performance to vary in ways differently than described by a normal distribution. These can include a player's position on the team's depth chart, how far along a player is in their training as a professional or with a specific team, and the like.

FIG. **2** shows a flow diagram illustrating the method steps for generating and using tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention. In one embodiment, the system and method generates player projections **10**. In one embodiment, the system and method provides team management player selection guidance using probability distributions. In one embodiment of the present invention, the NFL player projections (i.e. historical) were provided by AccuScore. Over the course of the 2011 NFL season, the AccuScore projections were archived every week, creating a historical projections archive **20**. AccuScore, as with many other providers of player projections, projects player statistics, and also projects player fantasy points using a common set of fantasy point rules. In this embodiment of the present invention, only AccuScore's fantasy point projections were used. The archived fantasy point projection data was used as input, and the tiered probability distribution data was calculated **30** and written out to a file **40**.

It is contemplated that a more complex system that operates on each statistic and then convolves the resulting distributions together based on scoring rules is possible. However, the state-of-the-art for computing has not yet provided the computing power needed to support this application as a broadly available and competitively-priced consumer product.

Still referring to FIG. **2**, in Applicants' previous work, the system and method utilized projection variance (i.e. how much the projections change from week to week) separately from projection accuracy (i.e. how accurately the final projections match actual results). There, projection variance was modeled as a normal distribution with a standard deviation denoted as STDpp (standard deviation of projection-to-projection) and projection accuracy was modeled as a normal distribution with a standard deviation as STDpa (standard deviation of projection-to-actual). In contrast, in one embodiment of the method and system of the present invention, tiered probability distribution variance and accuracy data is used to build non-normal fantasy point distributions **50**. The system and method of the present invention enables a probability distribution-based team management guidance system **60** to generate more accurate recommendations for all player selection decisions, such as draft picks and/or starting lineup selection compared with a similar system that uses normal distributions.

As discussed above, tiered probability data generated from archived data is only valid for creating non-normal fantasy point projections when the same method is used to generate the new projections as was used for creating the archived projections. In one embodiment of the present invention, if a new method for generating projections is introduced, a new archive can be built retroactively by running the projection system with inputs as if it were the previous year.

FIG. **3** is a graphical representation of tiered, non-normal probability distributions showing how defensive backs' fantasy point projections varied from 12 weeks before the 2011 NFL season (FW−12) to week four into the NFL season (TW4), in accordance with one embodiment of the present invention. The projections of top-tier defensive backs dropped significantly compared with fourth-tier players. In one embodiment of the method and system of the present

invention, fifth-tier players are defined as players that are projected to have zero fantasy points. Since it is impossible to calculate a ratio of change when the base projection is zero, the average fantasy points of third-tier players was used as the base projection. See, for example, FIG. **6**. Thus, in this embodiment, the probability distribution of the fifth-tier players represents how the projections of players that are projected to score zero fantasy points twelve weeks before the season compare to the projections of third-tier players four weeks into the season.

FIG. **4** is a graphical representation of tiered, non-normal probability distributions showing how accurately the final fantasy point projections for the defensive backs matched the actual fantasy point scores, where player tiers are based on projections from 12 weeks before the 2011 NFL season (FW−12), in accordance with one embodiment of the present invention.

Attachment 1 (refer to attached CD-ROM) is a Microsoft Excel Worksheet that demonstrates an embodiment of the present invention for tiered projection variance and accuracy distributions for all player positions from all weeks to all weeks based on analysis of 2011 NFL AccuScore data using the system and method described herein. In one embodiment of the present invention, calculations are run from FW−12 (twelve weeks before the start of the NFL season) to TW17 (until the week 17 of the regular NFL season).

FIGS. **5**A-**5**F are snapshots from Attachment 1 that demonstrate generating and using tiered, non-normal player fantasy point projection distributions, in accordance with one embodiment of the present invention. For simplicity, FIGS. **5**A-**5**F show only the data for FW−12 (i.e. 12 weeks before the start of the NFL season) to TW 1 (i.e. one week into the NFL season). In FIGS. **5**A, **5**C and **5**E Column A shows which player position is being evaluated, where QB=quarterback, RB=running back, WR=receiver, TE=tight end, K=kicker, P=punter, DL=defensive lineman, LB=linebacker, DB=defensive back, and DEF-ST=defense and special teams. Positions that begin with TM are team positions and are generated by summing all players of the same team for a single position. For example, TMRB is the sum of all projected statistics for all running backs on a single NFL team.

In FIGS. **5**A, **5**C, and **5**E, Column B and C are the player tiers that the distribution represents. Tier 1 is the top 10 players based on the week −12 projections, Tier 2 is the 11th through 30th player for individual player positions and 11th through 20th for team positions (See, for example, FIG. **5**C). Tier 3 is the 31st through 100th player for individual player positions and 21st through 32nd for team positions (See, for example, FIG. **5**C). Tier 4 is the 101st through the last player with non-zero projections for individual player positions. Tier 5 is all individual players with a projection of zero.

Still referring to Attachment 1 (refer to attached CD-ROM), for variance distributions, column D in FIGS. **5**A, **5**C, and **5**E is the probability that the to-week projection is zero. Still referring to FIGS. **5**A, **5**C, and **5**E, Columns E through M are the probability that to-week projection changed by a range of percentage represented from the previous bin to the mid-point of the next bin. Referring to FIGS. **5**B, **5**D, and **5**F, Columns N through T are the probability that to-week projection changed by a range of percentage represented from the previous bin to the mid-point of the next bin, except that Column T extends to infinity. For accuracy distributions, columns D through T represent how the actual result differs from the last projection.

It is recognized that the prior art uses a model that assumes all players have equal upside and downside relative to their projected performance regardless of whether they are projected to be a top-tier player or a lower-tier player. In reality, players that are projected to perform at the very top of their respective sports league (top-tier players) generally have a smaller probability of significantly improving compared with the probability of a degraded performance over the course of a sports season.

It is also recognized that as the season progresses, top-tier players may end up playing with persistent injuries or other players on their team may be injured which can reduce a top-tier player's effectiveness. Fantasy sports end-users typically keep a handful of lower-tier players on their team rosters because these players have upside. For example, a backup running back might be projected to get ten percent (10%) of his team's rushing carries. But, if the starting running back gets injured the backup player could be projected to carry the ball eighty percent (80%) of the time.

In one embodiment of the present invention, in addition to dividing data by projected player performance tiers, data can be divided by player experience. For example, in certain embodiments, a rookie player might have more upside relative to projected statistics than a player that has been in the league twelve years. The non-normal distributions of the present invention have other uses toward player selection decisions besides the relative value of top-tier players to lower-tier players. For example, in certain embodiments, when providing guidance for setting a starting lineup, if a team's mean fantasy point projection is lower than the opposing team's mean fantasy point projection; there could be a statistical advantage to selecting players even though they have a lower mean projected performance, since they may have a higher upside potential. For example, in one embodiment of the preset invention, in a flex-position league, it might be statistically advantageous to start a wide receiver with a roughly equal probability of anywhere from one to ten receptions versus a starting running back with a much narrower range of projected performance and a roughly equal probability of anywhere from twenty to twenty-five carries.

As will be appreciated, the examples herein refer to fantasy football predictions, but it is understood that this methodology could be applied equally well to other sports, both fantasy and otherwise.

Attachment 2 (refer to attached CD-ROM) is a Microsoft Excel Worksheet that demonstrates an exemplary method for generating the non-normal variance and accuracy distributions shown in FIG. **3** and FIG. **4**. Still referring to Attachment 2 (refer to attached CD-ROM), Rows 142 through 161 show the average Tier 3 projections for each position, as shown in FIG. **6**. In certain embodiments, the average Tier 3 projections are used as a reference for calculating the change for Tier 5 players where the Tier 5 players have a base projection of zero.

Still referring to Attachment 2 (refer to attached CD-ROM), FIGS. **7**A-**7**F are snapshots of an archive of fantasy point data, in accordance with an embodiment of the present invention. In FIGS. **7**A-**7**F, Rows 163 through 199 are shown. Rows 163 through 40339 represent the archived AccuScore fantasy point data used in one embodiment of the method and system of the present invention. In FIG. **7**A, Column A shows the player position, Column B shows the calculated Tier, Column C shows what team a player is on, and Column D shows for what week a projection is made—also known as the "to-week". Week 18 is a special indicator meaning season total. For simplicity, only a portion of the data in Attachment 2 is shown, for example, only the Tier 1 defensive backs from MIA and CHI are shown in FIG. **7**A.

Columns E through AI show what projections are made each "from-week" from week −12 to week 17. See, for example, FIGS. **7**A-**7**C.

Still referring to Attachment 2 (refer to attached CD-ROM), Column AK in FIG. **7**C shows the last projection made for each "to-week" for each player and Column AL shows the actual fantasy point result achieved by the player in an actual NFL game. Column AO in FIG. **7**D (the second column from the left) shows the ratio of change from week −12 (FW−12) projections to week 1 (TW1) projections (i.e. the projection variance). In FIG. **7**D and **7**E, Columns AQ through BG show which bin the ratio falls in. Columns AN through AY are shown in FIG. **7**D, and Columns AZ through BL are shown in FIG. **7**E. When the −12 week projection is zero, the data is not included. Despite that, data sometimes shows up in the Excel worksheet in columns AQ through BG. Columns BJ through CB are similar to Columns AO through BG, except that the ratio shown in column BJ is for the actual result versus the last projection (i.e. the projection accuracy). Column BJ is the third column from the right in FIG. **7**E. To create final probability distributions, the total samples in each bin for each Tier are summed up and then divided by the total samples in all bins for the same Tier.

In FIGS. **8**A, **8**C, **8**E, and **8**G, Column A shows which player position is being evaluated, where QB=quarterback, RB=running back, WR=receiver, TE=tight end, K=kicker, P=punter, DL=defensive lineman, LB=linebacker, DB=defensive back, and DEF-ST=defense and special teams. Positions that begin with TM are team positions and are generated by summing all players of the same team for a single position. For example, TMRB is the sum of all projected statistics for all running backs on a single NFL team.

In FIGS. **8**A, **8**C, **8**E, and **8**G, Column B is the player tier that the distribution represents. Tier 1 is the top 10 players based on the week −12 projections, Tier 2 is the 11 th through 30th player for individual player positions (See, for example FIGS. **8**A and **8**E) and 11th through 20th for team positions (See, for example FIGS. **8**C and **8**G). Tier 3 is the 31st through 100th player for individual player positions (See, for example FIGS. **8**A and **8**E) and 21st through 32nd for team positions (See, for example FIGS. **8**C and **8**G). Tier 4 is the 101st through the last player with non-zero projections for individual player positions. Tier 5 is all individual players with a projection of zero.

Still referring to Attachment 2 (refer to attached CD-ROM), for variance distributions, Column C in FIGS. **8**A, **8**C, **8**E, and **8**G, is the probability that the to-week projection is zero. Columns D through M in FIGS. **8**A, **8**C, **8**E, and **8**G are the probability that the to-week projection changed by a range of percentage represented from the previous bin to the mid-point of the next bin. In FIGS. **8**B, **8**D, **8**F and **8**H, Columns N through T are shown. Columns N through S are the probability that the to-week projection changed by a range of percentage represented from the previous bin to the mid-point of the next bin, except that Column S extends to infinity. For accuracy distributions, Columns C through S represent how the actual result differs from the last projection.

As noted above, FIGS. **8**A-**8**H are snapshots from Attachment 2 that demonstrate generating the non-normal variance and accuracy distributions, in accordance with one embodiment of the present invention. In FIGS. **8**A and **8**B, Rows **1** through **34** are shown. In FIGS. **8**C and **8**D, Rows **35** through **68** are shown. In FIGS. **8**E and **8**F, Rows **69** through **102** are shown. In FIGS. **8**G and **8**H, Rows **103** through **136** are shown. Rows **1** through **69** show the variance of projections from week −12 to week 1 and rows **72** through **140** show the accuracy of final projections based on player tiers determined in week FW−12.

While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

What is claimed:

1. A computer-implemented method for using historical player projection data to build non-normal probability distributions for various tiers of player performance, comprising:

providing an archive of player fantasy point projections, wherein the archive comprises fantasy point projection data;

calculating tiered probability distributions of projection variances using the fantasy point projection data;

calculating tiered probability distributions of projection accuracy using the fantasy point projection data; and

creating non-normal fantasy point probability distributions from future player statistics projections thereby providing users with fantasy sport team management guidance.

2. The computer-implemented method of claim **1**, wherein the archive comprises AccuScore NFL player fantasy point projections.

3. The computer-implemented method of claim **1**, further comprising providing new player statistics projections.

4. The computer-implemented method of claim **1**, wherein calculating tiered probability distributions of the projection accuracy is based on the tiers from week −12.

5. The computer-implemented method of claim **1**, wherein calculating tiered probability distributions of the projection variances uses the average of Tier 3 players to approximate the variance for Tier 5 players.

6. The computer-implemented method of claim **1**, wherein the fantasy sport team management guidance comprises starting lineup recommendations.

7. The computer system for using historical player projection data to build non-normal probability distributions for various tiers of player performance, comprising:

providing an archive of player fantasy point projections, wherein the archive comprises fantasy point projection data;

calculating tiered probability distributions of projection variances using the fantasy point projection data;

calculating tiered probability distributions of projection accuracy using the fantasy point projection data; and

creating non-normal fantasy point probability distributions from future player statistics projections thereby providing users with fantasy sport team management guidance.

8. The computer system of claim **7**, wherein the archive comprises AccuScore NFL player fantasy point projections.

9. The computer system of claim **7**, further comprising providing new player statistics projections.

10. The computer system of claim **7**, wherein calculating tiered probability distributions of the projection accuracy is based on the tiers from week −12.

11. The computer system of claim **7**, wherein calculating tiered probability distributions of the projection variances uses the average of Tier 3 players to approximate the variance for Tier 5 players.

12. The computer system of claim 7, wherein the fantasy sport team management guidance comprises starting lineup recommendations.

13. A non-transitory computer program product comprising program instructions encoded on one or more computer readable mediums that when executed by one or more processors cause a process for using player projection data to build non-normal probability distributions to be carried out, the process comprising:

providing an archive of player fantasy point projections, wherein the archive comprises fantasy point projection data;

calculating tiered probability distributions of projection variances using the fantasy point projection data;

calculating tiered probability distributions of projection accuracy using the fantasy point projection data; and

creating non-normal fantasy point probability distributions from future player statistics projections thereby providing users with fantasy sport team management guidance.

14. The non-transitory computer program product of claim 13, wherein the archive comprises AccuScore NFL player fantasy point projections.

15. The non-transitory computer program product of claim 13, further comprising providing new player statistics projections.

16. The non-transitory computer program product of claim 13, wherein calculating tiered probability distributions of the projection accuracy is based on the tiers from week −12.

17. The non-transitory computer program product of claim 13, wherein calculating tiered probability distributions of the projection variances uses the average of Tier 3 players to approximate the variance for Tier 5 players.

18. The non-transitory computer program product of claim 13, wherein the fantasy sport team management guidance comprises starting lineup recommendations.

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